1-10. (CANCELED)

11. (PREVIOUSLY PRESENTED) A method for continuous measurement of thermal conductivity of a multi-functional fluid, the method comprising the steps of:

passing a sample of the multi-functional fluid through a space delimited by a first input face and a second exit face;

generating an increase in temperature of the sample of multi-functional fluid, at least by a very brief impulse of heat flux transmitted to the sample, through the first input face;

measuring the temperature increase in at least three separated points within the sample;

determining with the temperature increase measurement, an evolution of the multi-functional fluid temperature at the three points as a function of time;

determining thermodynamic characteristics of the sample of the multi-functional fluid as a function of the evolution; and

calculating a thermal conductivity of the sample.

12. (PREVIOUSLY PRESENTED) The method according to claim 11, further comprising the step of transmitting the impulses of heat flux in a repetitive manner; and

establishing a thermogram consisting of temperature evolution curves as a function of an amount of time between the transmitting the impulses of heat flux through the first input face and the evolution of temperature as determined at the three separated points within the sample.

13. (PREVIOUSLY PRESENTED) The method according to claim 11, further comprising the step of deducing the thermal conductivity with the following equation:

$$\frac{\partial T}{\partial t} + \alpha(k)\left[\frac{1}{k}.\frac{dk}{dT}\left(\frac{\partial T}{\partial x}\right)^2 + \frac{\partial^2 T}{\partial x^2}\right] = 0$$

where: T is the temperature;

k is the thermal conductivity dependent upon the temperature;

t is the time;

α is the thermal diffusivity dependant upon k and which is equal to:

$k(T)/\rho \cdot Cp$

with ρ and Cp being the volume mass and the specific heat.

14. (CURRENTLY AMENDED) A device for continuous measurement of thermal conductivity of a multi-functional fluid, the device comprising;

a means designed to pass a sample of the multi-functional fluid through a space delimited by a first input face and a second exit face of the sample;

a means for heating the sample to vary a temperature of the sample,

a means to measure variation of the temperature of the sample

a means to transmit to the sample, at least a very brief impulse of heat flux, through the first input face,

a means to measure a heat wave at three or more separate points within the sample;

a means to determine, on a basis of values measured, a temperature evolution of the multi-functional fluid as a function of time at the separate points within the sample;

a means to deduce, from the temperature evolution, thermodynamic characteristics of the sample of the multi-functional fluid; and

a means to calculate thermal conductivity of this sample;

the device for continuously measuring the thermal conductivity of the multi-functional fluid comprising the steps of:

passing the sample of the multi-functional fluid through the space delimited by the first input face and the second exit face;

generating the increase in temperature of the sample of the multi-functional fluid, at least by the very brief impulse of heat flux transmitted to the sample, through the first input face;

measuring the temperature increase in the at least three separated points within the sample;

determining with the temperature increase measurement, the evolution of the multi-functional fluid temperature at the three points as a function of time;

determining the thermodynamic characteristics of the sample of the said multi-functional fluid as a function of the evolution; [and]

calculating the thermal conductivity of the sample; and

wherein the means to determine the temperature evolution of the multi-functional fluid as a function of time comprises at least three temperature probes (S1, S2, S3) designed to measure the temperature of the sample of the multi-functional fluid at the at least three separated points within the sample.

15. (PREVIOUSLY PRESENTED) The device according to claim 14, wherein the means to pass the sample of the multi-functional fluid through the space delimited by the first and second faces includes an enclosure (31) with an insulating lining (32) and an interior coating of polished metal (33), which is continuously traversed by the multi-functional fluid.

16. (PREVIOUSLY PRESENTED) The device according to claim 14, wherein the means (37) to transmit the at least one very brief impulse of the heat flux comprises at least one laser (40).

17. (PREVIOUSLY PRESENTED) Device according to claim 14,wherein the means to transmit the at least one very brief impulse of the heat flux comprises an emitter tube (21).

18. (PREVIOUSLY PRESENTED) The device according to claim 14, wherein the means to measure the heat wave which has traversed the sample comprises a receiver tube (22).

19. (CANCELED)

20. (PREVIOUSLY PRESENTED) The device according to claim 14,wherein the means to deduce, from the temperature evolution at the three separate points in the sample of multi-functional fluid, the thermodynamic characteristics of the sample and to calculate the thermal conductivity comprises an arithmetic unit designed to receive from the temperature probes (S1, S2, S3), the signals corresponding to the values measured.

21. (NEW) A method for continuous measurement of thermal conductivity of a multi-functional fluid, the method comprising the steps of:

passing a sample of the multi-functional fluid through a space delimited by a first input face and a second exit face;

generating an increase in temperature of the sample of multi-functional fluid, at least by a very brief impulse of heat flux transmitted to the sample, through the first input face;

measuring the temperature increase with at least three temperature probes within the sample;

determining with the temperature increase measurement, an evolution of the multi-functional fluid temperature at the three temperature probes as a function of time;

determining thermodynamic characteristics of the sample of the multi-functional fluid as a function of the evolution; and

calculating a thermal conductivity of the sample.

22. (NEW) The method according to claim 11, further comprising the step of transmitting the impulses of heat flux in a repetitive manner; and

establishing a thermogram consisting of temperature evolution curves as a function of an amount of time between the transmitting the impulses of heat flux through the first input face and the evolution of temperature as determined at the three separated points within the sample.

23. (NEW) The method according to claim 11, further comprising the step of deducing the thermal conductivity with the following equation:

$$\frac{\partial T}{\partial t}+\alpha(k)\left[\frac{1}{k}\cdot\frac{dk}{dT}\left(\frac{\partial T}{\partial x}\right)^2+\frac{\partial^2 T}{\partial x^2}\right]=0$$

where: T is the temperature;

k is the thermal conductivity dependent upon the temperature;

t is the time;

α is the thermal diffusivity dependant upon k and which is equal to:

$k(T)/\rho\cdot Cp$

with ρ and Cp being the volume mass and the specific heat.